

AMENDED SPECIFICATION

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PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Ester of a Perfluoroalkanoic Acid and its Polymers

We, IMPERIAL CHEMICAL INDUSTRIES LIMITED, of Imperial Chemical House, Millbank, London, S.W.1, a British company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an ester of a perfluoroalkanoic acid and particularly to such an ester obtained by esterifying a hydroxyl group attached to an alkyl group in a hydroxyalkyl methacrylate; it also relates to polymers of the ester.

The esters of this type and their polymers possess hydrophobic and oleophobic properties which make them useful for coating materials and sizing cloth to give resistance to soiling. In order to have these properties the perfluoroalkyl chain of the perfluoroalkanoic acid should not contain too few carbon atoms for then the water- and oil-repelling powers would be too feeble, nor should it contain too many for then the ester would be too insoluble to be applicable to materials by known methods and its polymer might also be too insoluble or too hard or not sufficiently flexible; from 3 to 20 carbon atoms is a suitable range and particularly 4.

Thus according to one form of our invention we provide the hydroxyethyl methacrylate ester of perfluoroisobutyric acid. In another form of the invention we provide homopolymers of the ester and copolymers of it with other polymerisable monomers.

The ester of the invention can be prepared

by reacting the hydroxyalkyl methacrylate with the perfluoroalkanoic acid or with the acid chloride or acid anhydride, or with a lower alkyl ester, for example the methyl or ethyl ester, of the acid.

The ester can be polymerised, for example with a free-radical-producing initiator such as benzoyl peroxide, and the polymer applied to textile materials, glass, paper and other solid materials, for example solid polymers, as a solution in a suitable solvent, for example 1,1,2-trichloro-1,2,2-trifluoroethane. Alternatively the ester can be applied to the substrate and polymerised in situ provided the ester is not so volatile as to be lost from the surface before polymerisation takes place. The ester can also be co-polymerised with other polymerisable monomers, for example methyl methacrylate. Both homopolymerisation and copolymerisations can be carried out in emulsion systems. The homopolymers and copolymers impart a high degree of water- and oil-repellency to surfaces to which they are applied, thus giving the latter good resistance to soiling.

The invention is illustrated by the following Examples.

EXAMPLE 1

Perfluoroisobutyryl chloride (280 g.) was added dropwise to a stirred solution of β -hydroxyethyl methacrylate (130 g.) in pyridine (95 g.) containing a small amount (0.5 g.) of hydroquinone. After stirring the mixture for one hour it was poured into dilute hydrochloric acid and extracted with ether. Distil-

lation of the ether extract gave 230 g. ethylene glycol mono-methacrylate mono-perfluoroisobutyrate, a liquid boiling at 52°—54°C under 0.20 mms. Hg.

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EXAMPLE 2

An aqueous emulsion of ethylene glycol mono-methacrylate mono-perfluoroisobutyrate prepared as described in Example 1 was heated at 60°C with 2% by weight (of the ester) of potassium persulphate as catalyst for 40 minutes. The resulting polymer latex when applied to cotton fabrics and woollen fabrics imparted pronounced oil- and water-repelling properties thereto.

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WHAT WE CLAIM IS:—

1. Ethylene glycol mono-methacrylate mono-perfluoroisobutyrate. 15
2. Homopolymers of ethylene glycol mono-methacrylate mono-perfluoroisobutyrate.
3. Copolymers of methyl methacrylate with ethylene glycol mono-methacrylate mono-perfluoroisobutyrate. 20
4. The ester and its homopolymers and copolymers substantially as hereinbefore described and with reference to the Examples. 25

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Reference has been directed in pursuance of Section 9, subsection (1) of the Patents Act, 1949, to patent No. 1,096,392.

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